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Welding Technology During the
Postwar Five-Year Plan

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RESTRICTEDWELDING TECHNOLOGY DURING THE POSTWAR FIVE-YEAR PLAN

The welding techniques during the years of Stalin's post-war five-year plan have shown great improvements.

A decisive victory of automatic over manual welding processes was obtained as a result of a decision of the government. Our land, while successfully developing its progressive method of welding - automatic welding under a flux ---- secured its wide application in many plants and at new construction sites. Permanent bases for the production of equipment for automatic welding were created in the Institute of Electric Welding imeni Academician Ye. O. Paton, at the Elektrik Plant, in the Central Scientific Research Institute of Technology and Machine Building and in other organizations, these bases supply industry with simply constructed, inexpensive, and conveniently operated welding attachments and tractors for welding at various currents (AVS, SAG-4, ADS-1,000, TS-17, UT-1,500, and others).

Through the work of the Institute of Electric Welding imeni Ye. O. Paton, the Central Scientific Institute of Technology and Machine Building, and other organizations, various domestic fluxes for the welding of carbon and alloy steels were created. The supply of industry with welding equipment and materials (wire, fluxes) contributed to the successful introduction of automatic welding under flux in boiler and apparatus construction, in the production of architectural constructions, in the production of ships, in the installation of gas pipelines and in many other fields. The replacing of manual welding with automatic welding contributed to the significant rise of the productivity of labor, the economy of materials and of electrical power, and to the rise of production technology.

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The processes of manual arc welding were considerably improved. Various types of electrodes of high quality for the welding of carbon, low-alloy constructional and alloy steels (TSM-7, MEZ-4, TSL-6, and others) were developed industrially by the Central Scientific Research Institute of Technology and Machine Building, the Moscow Higher Technical School imeni Bauman, and other institutions, as well as by the Kirov, Sverdlovsk Uralmash, and Electrode plants. Many constructional low-alloy steels, high-alloy steels, non-ferrous alloys and other materials are welded on aluminum and magnesium bases. Almost exclusively, high-grade electrodes^{are} applied in welding. A series of efficient methods for manual welding have been worked out, of which, welding with a three-phase current, multiple arcwelding and welding with a deep fusion, merit attention.

The Elektrik plant and others supply industry with a welding apparatus^{es} of high quality: STE-24, STE-34, and STN-500 transformers of the design of Academician V. P. Nikitin, and others.

A firm foundation for the development of gas-flame metal-processing methods^{was established through the organization} and development of the All-Union Scientific Research Institute of Autogenous Metal Processing. Apparatus and machines for high-production mechanized gas cutting, machines for precision oxygen cutting, for the surface treatment of a metal and for the repair of defects were created and manufactured. A series of acetylene generators of original design, and original models of metalizing apparatus^s of high quality were created and manufactured. New methods in applying gas flames, and arc welding in inert gases are being worked out and introduced.

Many new progressive methods of welding have been worked out, of which a number deserve mentioning, such as underwater arc welding and cutting (member of the Academy of Sciences, Ukrainian SSR, K. K. Khrenov), welding in a jet of argon (Scientific Research Institute of Technology and Organization of the Aviation Industry), gas-pressure

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welding (All-Union Scientific Research Institute of Autogenous Metal Processing, Central Scientific Research Institute of Railroad Transportation, All-Union Scientific Research Institute, Scientific-Engineering - Technical Society of Welders), welding under a flux with an infusible ^{with a} ~~electrode-carbon~~ ^{electrode} (Moscow Higher Technical School imeni Bauman) and tungsten (Moscow Aviation - Technical Institute), ~~welding with~~ melting the base and the fused-on metals by separate processes during welding (Section of Electric welding and Electrothermics, Academy of Sciences, USSR), and welding with high frequency currents (laboratory of member V. P. Vologdin, Moscow ^{Petroleum} ~~Oil~~ Institute, and others).

New methods for inspecting welded joints were worked out (Moscow Higher Technical School and others); inspection by radium gamma rays was widely introduced in industry.

The preparation of cadres for welding was considerably improved. Welding production faculties were created in the Moscow Higher Technical School imeni Bauman, and in the Kiev Polytechnical Institute. Welding specialities were developed in the Leningrad Polytechnical Institute, in the Moscow Aviation Technological Institute and in other higher technical schools.

The Science of Welding has been greatly enriched by numerous researches and the issue of a large number of monographs on welding techniques. Among these articles are: various articles by Ye. O Paton and his co-workers, on automatic welding under flux, "Thermal Principles of Welding" by N. N. Rykalin, "Welding Pressure and Deformation" by N. O. Okerblom, "Welding Structures and Joints" by G. A. Nikolayev and A. S. Gelman, "Automatic Arc Welding" by K. K. Khrenov and S. T. Nazarov, "The Theory of Welding Processes " by G. I. Pegodin-Alekseyev, and "Questions on the Theory of Welding

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Processes" by A. A. Alov, K. V. Lyubavskiy, I. L. Brinberg and A. S. Gelman.

The work of the separate All-Union Scientific Technical Society of Welders has significantly improved; particularly in its Leningrad, Kharkov and Gorkiy divisions.

On the basis of the creative mutual friendship with the scientific research institutes and laboratories, our plants (Krasnoye Sormovo, Krasnyy Kotel'shchik, Uralmash, and many others) achieved great successes in the work of introducing the foremost technology of welding production. The foremost welders and technical engineering workers contributed much to the achievement of these successes. All of this was reflected in the awarding of Stalin prizes in 1949 to a group of workers of the welding trade: K. V. Lyubavskiy, I. D. Davidenko, I. N. Gerasimenko, V. I. Melnik, P. P. Markyshev, L. N. Krasnopol'skiy, A. G. Shapovalov and others.

In the future great and responsible tasks stand before the welders of USSR. The welders must work in high gear to achieve the fulfillment and overfulfillment of production plans pertaining to all sections of industry and transportation, and must unceasingly contribute to the rise of the productivity of labor and the increase of the output of production while lowering its cost and raising its quality.

It is urgent that the following measures be effected:

1. Persistently continue to introduce automatic welding under flux in all branches of industry with the aim of increasing the output of the existing apparatus and the creation of new. Broaden the output of automatic and semi-automatic equipment (types equipped with flexible electrodes, types for rivet-welding, and for such specialized processes as welding joints of heat-generating systems),

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of equipments^g for welding in a vertical position^{of devices} and for three-phase welding, and of other equipment.

Continue the search for fluxes with the aim of utmost broadening of the assortment of alloy steels and non-ferrous alloys which can be welded under a flux.

2. Work out a scientific system for turning out welded structures, replacing old methods with such advanced ones as automatic welding under flux, contact welding, and argon-arc welding.~~needs~~

3. Establish criteria of weldability so that requirements may be presented^f to the metallurgical industry which will insure the supply of the best carbon and alloy steels for the various welding needs.

4. Intensify research on new welding methods such as: Gas-pressure (in relation to the application of available gases), argon-arc -- by creating new designs of automatic and semi-automatic units, welding with high frequency currents and others.

5. Expand research on gas flame processing of metals, ^{including} ~~such as,~~ gas cutting, cleaning, rounding off, ^{and} drilling, ~~and others.~~

6. Expand research in the field of highly economical contact machines of great power (electromagnetic, condenser, machines with automatic regulation of welding processes, machines for butt welding sheets and pipes, and others).

7. Continue the search for new types of electrodes and continue the development of improved and highly productive methods of their manufacture.

8. Mechanize all auxiliary processes performed in welding, develop special attachments for welding, and introduce productive assembly methods (large block, assembly in the hot state, etc.)

9. Improve the preparation of the cadres of welders by the creation and development of welding faculties, ^gby increasing the

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quota of admission, ~~through the opening of~~ specialized welding technical schools under the various ministries and expanding the training of welders through a system of trade schools.

The lead in the field of welding metals achieved by the scientists and inventors V. V. Petrov, N. N. Benardos, and I. G. Slavyanov must be maintained.

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